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I HEREBY CERTIFY that annexed hereto is a true copy of documents filed in connection with the following patent application:

Application No. S2000/0712

Date of Filing 7 September 2000

Applicant RICHMOUNT COMPUTERS LIMITED, an Irish Company of Maple House, South County Business Park, Leopardstown, Dublin 18, Ireland.

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S 0007 12

FORM NO. 1

**REQUEST FOR THE GRANT OF A PATENT
PATENTS ACT, 1992**

The Applicant named herein hereby request

 the grant of a patent under Part II of the Act

X the grant of a short-term patent under Part III of the Act

on the basis of the information furnished hereunder.

1. APPLICANT

Name

Richmount Computers Limited

Address

**Maple House, South County Business Park,
Leopardstown, Dublin 18, Ireland**

Description/Nationality

An Irish company

2. TITLE OF INVENTION

"An Improved Field Replaceable Unit"

**3. DECLARATION OF PRIORITY ON BASIS OF PREVIOUSLY FILED
APPLICATION FOR SAME INVENTION (SECTIONS 25 & 26)**

Previous filing date

Country in or for
which filed

Filing No.

4. IDENTIFICATION OF INVENTOR(S)

Name(s) of person(s) believed by Applicant(s) to be the inventor(s)

1. Barrie Jeremiah Mullins

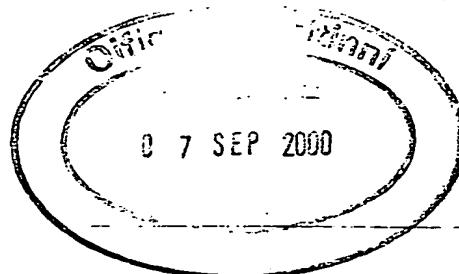
Address

1.

5. STATEMENT OF RIGHT TO BE GRANTED A PATENT (SECTION 17(2)(B))

By virtue of

Contd./...



6. ITEMS ACCOMPANYING THIS REQUEST - TICK AS APPROPRIATE

- (i) ☒ prescribed filing fee EUR 63.49 (IR£50.00)
- (ii) ☐ specification containing a description and claims
☒ specification containing a description only
☒ Drawings referred to in description or claims
- (iii) ☐ An abstract
- (iv) ☐ Copy of previous application(s) whose priority is claimed
- (v) ☐ Translation of previous application whose priority is claimed
- (vi) ☐ Authorisation of Agent (this may be given at 8 below if this Request is signed by the Applicant(s))

7. DIVISIONAL APPLICATION

The following information is applicable to the present application which is made under Section 24

Earlier Application No:

Filing Date:

8. AGENT

The following is authorised to act as agent in all proceedings connected with the obtaining of a Patent to which this request relates and in relation to any patent granted -

Name

F. R. KELLY & CO.

Address

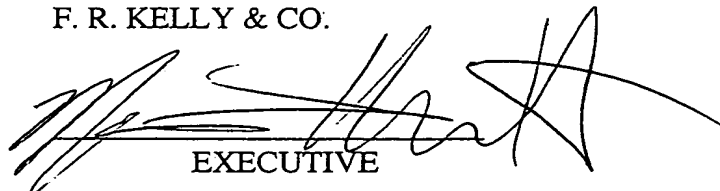
at their address as recorded for the time being in the Register of Patent Agents

9. ADDRESS FOR SERVICE (IF DIFFERENT FROM THAT AT 8)

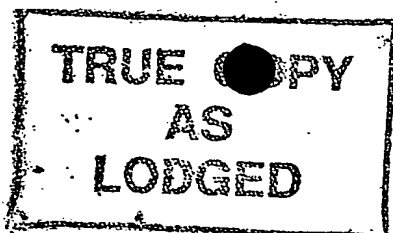
RICHMOUNT COMPUTERS LIMITED

F. R. KELLY & CO.

By:


EXECUTIVE

Date: September 7, 2000



APPLICATION NO. S 000712

1

An Improved Field Replaceable Unit

The present invention relates to a field replaceable unit (FRU).

5

Conventional field replaceable units often include circuitry such as LED's, displays or buttons in a front plate accessible to an operator. This circuitry connects through PCBs or cabling to a rear mounted connector. A complementary connector for the front plate circuitry is located on a backplane, so that as the FRU is inserted into an enclosure, the FRU rear mounted connector, completing a circuit from the front of the unit to the rear of the unit, makes contact with this backplane connector. It has been recognised, however, that either of such FRU or backplane connectors may fail from time to time. In the case of the connector on the FRU, failure may simply require the replacement of the FRU. If the FRU is a disk shuttle - the enclosed disk may in fact be re-used if required. On the other hand if the backplane connector fails, then the entire backplane may need to be removed and even replaced at an extremely high cost.

25 This problem has been recognised in the case of LED outputs and solved by the replacement of the backplane connector with a LED, co-operating with a light pipe running the length of the FRU through to an aperture in the front plate 12. A disk shuttle example, of such an FRU is fully described in US Patent No. 6,050,658 the disclosure of which is incorporated herein by reference. When this disk shuttle is inserted in the rack enclosure, the light pipe lies in register with

the LED, so that when the LED is on, the light pipe transmits this light through to the front plate, so displaying the state of the LED at the front of the rack enclosure. This solution, however, does not solve
5 the original problem in the case of LCD displays or button inputs which may be located on the front-plate and so at the very least different components would be required for input or output signals.

10 The use of conventional connectors for completing circuits between a rack backplane and field replaceable unit involves additional cost in manufacturing the backplane to include extra connector components; and cost of PCB or cable for carrying a signal through to
15 the front of the unit. It also exposes a system to a number of possible errors due to a large number of components including: backplane connector, field replaceable unit connector and field replaceable unit PCB or cables.

20

The present invention seeks to mitigate these problems and others of the prior art.

According to the present invention, there is provided a
25 field replaceable unit comprising:

a housing having a front and a rear and being configured for sliding insertion into and out of a rack from its rear; and

a connector for, in use, completing an
30 electrical circuit from a backplane of said rack to a component of said field replaceable unit, said connector comprising a first rear projecting electrically conductive spring loaded member operative

to engage an electrical pad on said backplane when said housing is inserted in said rack.

Preferably, the field replaceable unit incorporates a front plate removably attached to said housing and including said component, and said connector comprises a second front projecting electrically conductive spring loaded member electrically coupled to said first electrically conductive spring loaded member and operative, when said front plate is attached to said housing, to engage a second pad electrically coupled to said component and disposed behind said front plate.

Using the present invention, the possibility of having a faulty connection between, say a backplane, and the field replaceable unit is reduced and problems associated with such a faulty connection are mitigated as, if such a fault occurs, only the field replaceable unit incorporating the connector need be replaced, rather than possibly having to replace an entire backplane to which the field replaceable unit as well as many other devices connect.

Furthermore, using the invention requires only the provision of simple pads on the backplane, so reducing the cost of the backplane, as there is no need for connectors, PCB's or cables.

The field replaceable unit of the invention can incorporate both input and output signal components using the same connectors so reducing manufacturing cost due to the reduced number of different parts required for a system.

An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

5 Figure 1 is a perspective view of a disk shuttle according to a preferred embodiment of the invention in operation with a backplane; and

Figure 2 is a detailed view of a spring loaded
10 connector component incorporated in the disk shuttle of Figure 1.

Referring now to Figure 1 which shows a field replaceable unit according to the invention. The
15 preferred embodiment is described in terms of a disk shuttle or carrier 10, however, it will be seen that the present invention is applicable to any field replaceable unit including not alone shuttles for other devices such as power supply units, fan units, switch
20 modules and any other rack mountable device, but also for integrated field replaceable units.

Such field replaceable units are adapted to be slidably located within a shelf of an enclosure (not shown) and
25 to make contact with a backplane 30. The backplane 30 in turn includes tracks which enable power, control and/or data circuits to be shared between devices within the enclosure.

30 The shuttle comprises a hollow casing having a substantially constant rectangular cross-section defining a rear aperture 14 and a front aperture 16 through which a disk drive (not shown) is inserted in

the shuttle. Once the disk drive is located within the shuttle, a front plate 12 is clipped over the front aperture of the shuttle.

5 The disk drive itself includes a connector (not shown) which positively connects to a corresponding connector mounted on the backplane. That is to say that pins within the disk drive connector slide into sockets within the backplane connector to complete the
10 electrical connections from the disk to the backplane.

In the preferred embodiment, the front plate 12 of the disk shuttle 10 also includes some electrical circuitry, in this case, a pair of LED's 22. Other
15 examples include but are not limited to an LCD display or button inputs.

The casing has profiled side walls 18, 20 suitable for locating the assembled shuttle within the rack
20 enclosure in a conventional manner. In the preferred embodiment of the present invention, the side wall 20 of the shuttle incorporates a connector comprising a pair of double pointed spring loaded pins 24 (only one shown) one for each LED running from the front to the
25 rear of the shuttle.

Referring now to Figure 2 which shows one of the connectors in more detail. Each connector 24 comprises a cylindrical body 26 which may or may not be
30 electrically conductive. For ease of fabrication, the body may, for example, comprise two semi-cylindrical parts snapped or otherwise fixed together. Two pins 26 are located with the body, each comprising a circular

base member 28, linked by a shaft 30 which passes through the end of the body 26 to an electrically conductive contact 32, which in the present example is conical. A coil spring 34 is located in the body 26
5 between the two base members 28 and tends to urge each of the pins 26 out of the body. In the preferred embodiment, extension of the coil spring is limited by stop members 32 within the body, and compression of the spring is limited to the point the contacts 32 engage
10 respective end faces of the body 26.

If each of the pins 26 is completely electrically conductive, then it is sufficient for the coil spring to be conductive to ensure electrical continuity
15 between the pin contacts 32. To ensure this further, the coil spring 34, could in fact be soldered or otherwise fixedly connected to each of the base members 28.

20 Alternatively, if the spring were not made from electrically conductive material, then the circuit from pin to pin could be completed through an electrically conductive connector body - although this may prove more difficult to shield than a conductive spring.

25 Referring back to Figure 1, the length of the connector 24 is such that the front facing contact makes contact with and is compressed by a pad (not shown) located at the rear of the front plate 12 as the front plate is
30 located on the shuttle. Furthermore, when the disk shuttle 10 is inserted in the rack enclosure, the rear facing contact is brought into contact with and compressed by an electrical pad 34 located on the

backplane and tends to compress the spring 34 so
completing an electrical circuit from the backplane 30
to the LED or any electrical, electronic or electro-
mechanical input or output device located within the
5 front plate 12.

While the preferred embodiment has been described in
relation to a double-ended connector, it will be seen
that many of the advantages of the invention are
10 derived simply from the provision of the single contact
connecting the FRU to the backplane 30.

Furthermore, it should be seen that while the
embodiment depicts a connector comprising an internal
15 spring, the invention is equally implementable with
different types of resilient member urging the contact
outwards from the FRU.

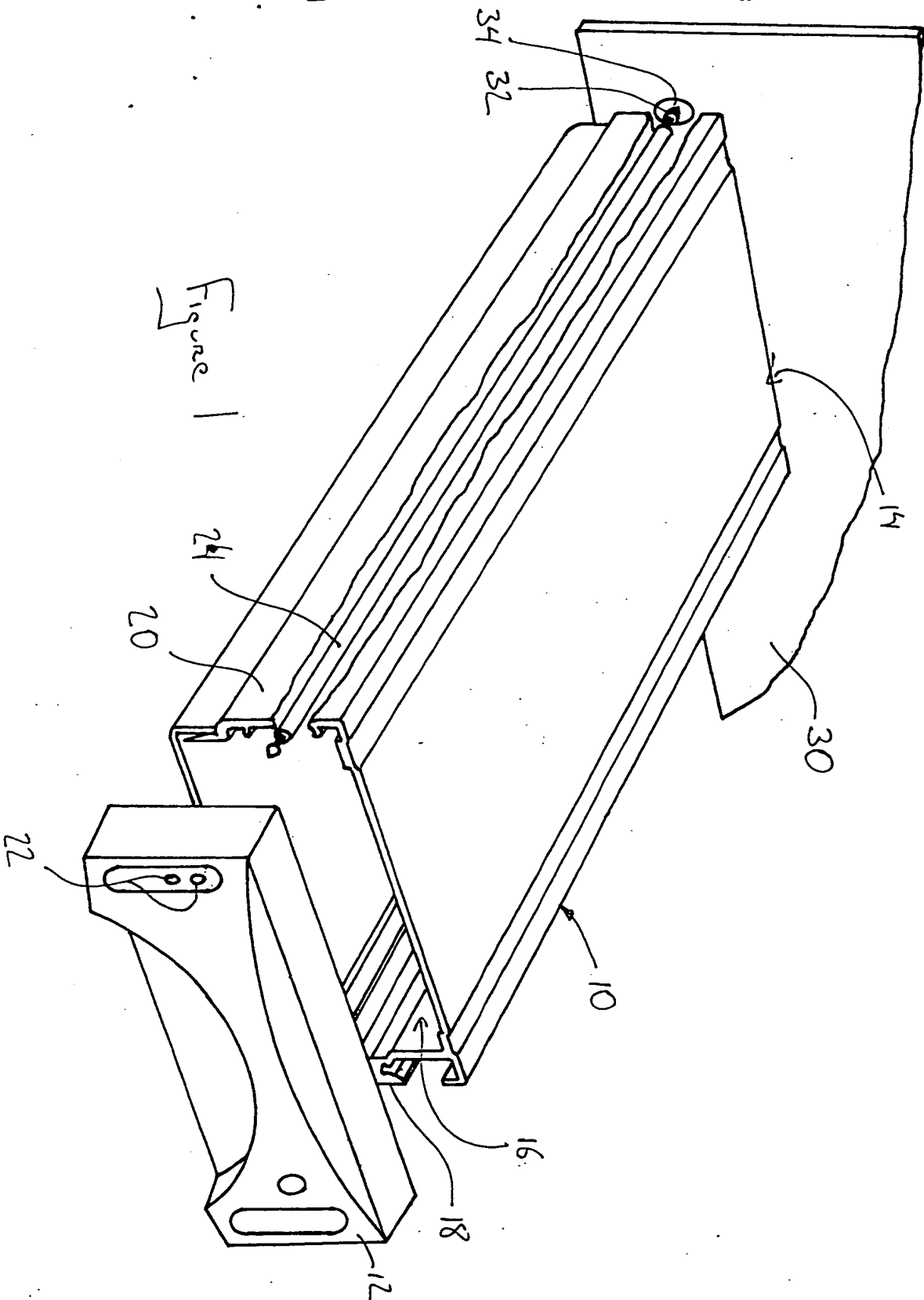


Figure 1

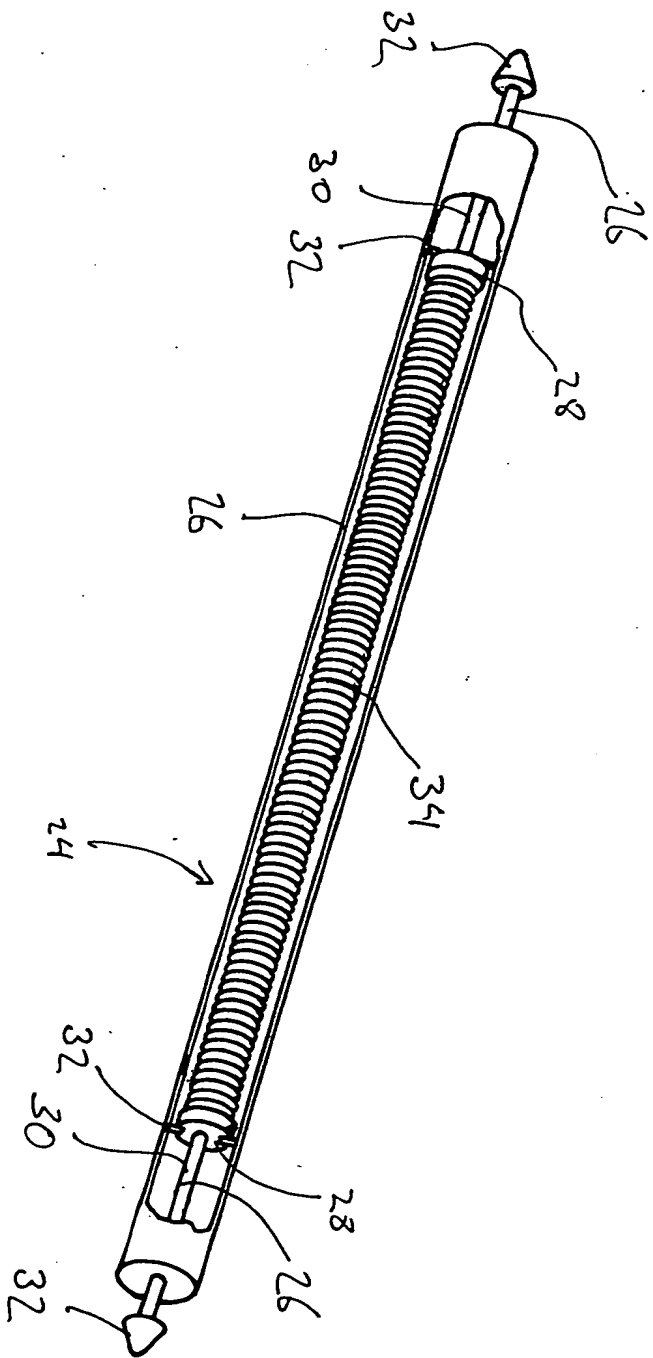


Figure 2.